

SPECIFICATION

TITLE OF THE INVENTION

PRINT SERVER APPARATUS, INFORMATION PROCESSING APPARATUS
5 AS CLIENT, PRINT MANAGING METHOD FOR THESE APPARATUSES,
AND STORAGE MEDIUM

FIELD OF THE INVENTION

The present invention relates to a print server
10 apparatus, an information processing apparatus as a
client, a print managing method for these apparatuses
and a storage medium, and more particularly, to print
job management in a print server system having a server
apparatus which monitors print jobs executed by a
15 printer and a clients which request printing.

BACKGROUND OF THE INVENTION

In conventional print systems, a print job, to be
executed by a print request from a client, is stored
20 into a print server. The print server manages the order
of print jobs, and monitors a printer as an output
destination. If print-output is possible in the printer,
the print server outputs the print jobs in print order
to the printer, and clears the print jobs.

25 Further, in recent print systems, to reduce load
on a network and a print server, a client transmits only

a print request for execution of print job to the print server. The actual print job is stored in the client. When the print server receives the print request, it manages the order of print jobs, and if it is determined
5 that print-output is possible in the printer, the print server sends a print permission to the client. The client directly outputs the print job to the printer and clears the print job.

In this manner, generally, one of a server that
10 manages the order of print jobs and a client that issues a print request holds (spools) a print image as the actual object of print job. In a case where the server holds the print image, (in case of server spool), even when the client is down, the print job is ensured, and
15 the printer status can be intensively managed. On the other hand, in a case where the client holds the print image (in case of client spool), as the print image is transmitted only from the client to the printer, the frequency of occurrence of LAN busy status is low.

20 In the above system, the object to be spooled in the server or client is a print image of the print job, i.e., only print data actually outputted to the printer. Further, when the print data has been outputted to the printer, the spool data in the server or client is
25 deleted (cleared), and reuse of the data or the like is not considered.

Further, the client can obtain a list of print jobs spooled in the server and display job information (document names, owners names, print request times), however, as the job information of the print jobs
5 spooled in the server include a small amount of information, it is impossible to know actual print-outputs to be obtained from the print jobs.

As described above, in the system where one of the server and the client has an image spooler has the
10 following problems.

In a system where a server holds print data (print image), the print-data transmission routes are (I) client-server and (II) server-printer, i.e., the data is transmitted always via the server. This increases load
15 on the LAN and easily causes a busy status. Further, as the server spools print data from a plurality of clients, it requires a large capacity memory. This increases load on the server and costs.

On the other hand, in a system where a client
20 holds print data, the client cannot refer to a print job to be executed by a print request from another client. Otherwise, even if the client can obtain a list of print jobs to be executed by print requests from the clients to the server, the client can not obtain actual print-
25 outputs of jobs regarding which the client did not issue print requests, only from the document names and the

like. Further, when a client spooling a print job is down, the print job is not ensured.

SUMMARY OF THE INVENTION

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Accordingly, it is a first object of the present invention to provide a print server system where a server and a client both have an image spooler, and the server automatically determines one of the spoolers to print-output an image stored there.

Further, it is a second object of the present invention to provide a print server system where a server and a client both have an image spooler, and a user selects one of the spool functions to be used to spool print data.

Further, it is a third object of the present invention to provide a print server system, where a server and a client both have an image spooler, automatically selects one of the spool functions to be used to spool print data.

Further, it is a fourth object of the present invention to provide a print server system where a client displays previews of print jobs spooled in a server or the client.

According to the present invention, the foregoing first object is attained by providing a server apparatus

capable of communicating with at least one client and a
printer via a network, comprising: image storage means
for storing print data of a print job to be executed by
a print request from the client; order management means
5 for managing a print order of the print job to be
executed by the print request from the client; and
control means for transmitting print data of the print
job in the print order from the image storage means to
the printer if the print data is not transmitted from
10 the client to the printer.

Further, according to one aspect of the present
invention, the foregoing second object is attained by
providing an information processing apparatus as a
client capable of communicating with a server apparatus
15 which manages a print order and a printer via a network,
comprising: image storage means for storing print data
of a print job to be executed by a print request;
selection means for causing a user to select a spool
function of the image storage means or that of the
20 server apparatus for storing print data of a print job
to be executed by a print request to the server
apparatus; and control means for, if it is determined by
using the selection means to use the spool function of
the server apparatus, transmitting the print data to the
25 server apparatus, while if it is determined by using the
selection means to use the spool function of the image

storage means, controlling the image storage means to store the print data.

Further, according to another aspect of the present invention, the foregoing third object is

5 attained by providing an information processing apparatus as a client capable of communicating a server apparatus which manages a print order and a printer via a network, comprising: image storage means for storing print data of a print job to be executed by a print

10 request; determination means for determining one of a spool function of the image storage means and that of the server apparatus for storing print data of a print job to be executed by a print request to the server apparatus; and control means for, if the determination

15 means determines to use the spool function of the server apparatus, transmitting the print data to the server apparatus, while the determination means determines to use the spool function of the image storage means, controlling the image storage means to store the print

20 data.

Further, according to another aspect of the present invention, the foregoing fourth object is attained by providing an information processing apparatus as a client capable of communicating with a

25 server apparatus which manages a print order and a printer via a network, comprising: image storage means

for storing image data of a print job to be executed by
a print request; list acquisition means for acquiring a
list of print jobs managed by the server apparatus; job
designation means for designating a print job to be
5 previewed based on the list of print jobs acquired by
the acquisition means; image acquisition means for, if
image data of the print job designated by the
designation means is stored in the image storage means,
reading the image data from the image storage means,
10 while if the image data is stored in the server
apparatus, downloading the image data from the server
apparatus; and control means for displaying a preview
image based on the image data acquired by the image
acquisition means.

15 The above objects of the present invention are
attained by providing a print managing method
corresponding to the above server apparatus and the
information processing apparatus as a client, and a
storage medium holding a program to realize the print
20 managing method.

According to the server apparatus or the
information processing apparatus as a client in the
print server system of the present invention, a print
image is transmitted from one of image storage means, in
25 accordance with network construction or operating status,
by the user's designation or the client's automatic

determination based on predetermined conditions. Thus an efficient and flexible system can be provided.

Other features and advantages of the present invention will be apparent from the following

5 description taken in conjunction with the accompanying drawings, in which like reference characters designate the same name or similar parts throughout the figures thereof.

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BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together
15 with the description, serve to explain the principles of the invention.

Fig. 1 is a block diagram showing the construction of a print server system of the present invention;

Fig. 2 is a block diagram showing the construction
20 of a server and a client in Fig. 1;

Fig. 3 shows a sequence in the server when image printing is required from the client;

Fig. 4 is a flowchart showing the processing by the server corresponding to the sequence in Fig. 3;

25 Fig. 5 is an example of screen image for selecting the client or the server to send a print image to the

printer;

Fig. 6 is an example of screen image showing jobs managed by the server;

Fig. 7 is an example of print logs showing the
5 histories of the jobs respectively at the completion of execution;

Fig. 8 is a table showing processes stored in a storage medium to realize a first embodiment of the present invention;

10 Fig. 9 is an example of screen image for a user's designation of one of spool functions;

Fig. 10 is a flowchart showing the operation of the system to automatically disable one of the spool functions;

15 Fig. 11 is an example of screen image showing print jobs managed by the server;

Fig. 12 is a flowchart showing the operation upon start of preview function; and

Fig. 13 is a table showing processes stored in a
20 storage medium to realize second to fourth embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 Preferred embodiments of the present invention will now be described in detail in accordance with the

accompanying drawings.

Fig. 1 is a block diagram showing the construction of a print server system according to a first embodiment of the present invention. In Fig. 1, reference numeral 5 11 denotes a LAN (Local Area Network) connectable to a personal computer, a work station, a printer and the like in accordance with TCP/IP protocol or the like; 12, a client terminal such as a personal computer or a work station which issues a print request; 13, a memory 10 device such as a hard disk attached to the client terminal; and 14 and 15, client terminals similar to the client terminal 12. The client terminals 14 and 15 do not necessarily have a memory device such as a hard disk.

Numeral 16 denotes a server apparatus having means 15 for storing issuance of print-output requests, when issued from the client terminals 12, 14 and 15; 17, a memory device such as a hard disk, attached to the server 16; and 18, a printer which print-outputs images in accordance with output requests from the client 20 terminals 12, 14 and 15.

Fig. 2 is a block diagram showing the construction of the client terminals 12, 14 and 15 and the server 16. Numeral 21 denotes a system bus connecting the respective elements; 22, a CPU which controls the system 25 based on various programs stored in a ROM or other storages; 23, a ROM in which control code (including a

printer driver and a print control program) executed by the CPU 22 is stored; and 24, a RAM used as a work area for the CPU 22 or the like.

Numeral 25 denotes an image manager. In the client terminal, upon issuance of output request to the server, an EMF file (intermediate file) obtained from an OS and print data generated by the printer driver are stored. In the server, when a server spooler is used, output request images (print data and EMF files) from the respective clients are stored. The image manager 25 serves as a spooler to hold print images. In this manner, the clients and the server respectively have the image manager in the present embodiment.

Numeral 26 denotes a job manager. In the client, the job manager 26 stores information which is periodically updated from the server. In the server, the job manager 26 adds job information to stored job information in accordance with print requests from the respective clients, manages the print order, and manages information deleted after print-output by the printer is managed. Further, the job manager 26 manages statuses of plural printers via the LAN 11, and if the job manager determines that print output is possible by the printer, it transmits print data of a print job spooled in the image manager to the printer, or generates transmission permission information indicative of permission to a

client, which required execution of the print job in the print order, to transmit print data to the printer.

Numeral 27 denotes a key input unit for the user to perform key operation; 28, a display unit such as a CRT which displays various information such as the contents of the job management; 29, a recorder which performs recording on a recording medium; and 210, a line controller which performs communication with the server, the clients and the printer, and controls the protocol for the LAN.

Fig. 3 shows a sequence in the print server system when image printing is required from the client. In Fig. 3, processing is sequentially performed in order of reference numeral among the client, in an top-to-bottom direction in the figure, the client 12, the server 16 and the printer 18. In this figure, an arrow represents information transmission, and a box, processing by each device.

First, printing is selected by the operator's designation, and the following sequence processing is performed. Upon selection of printing by the operator's designation, the application outputs a GDI (Graphical Device Interface) function as drawing data to drawing means of the OS. In Windows OS (a trade mark of Microsoft Corporation), the drawing means of the OS corresponds to Win32API. The drawing means of the OS

generates a DDI (Device Driver Interface) function based on the GDI function received from the application, and outputs the generated function as an EMF file. The printer driver converts the DDI function into print data
5 and spools the print data in a print spooler. When all the print data has been generated, the print data is outputted, in case of server spooler, to the server, while in case of client spooler, to the image manager 25.

When the print data has been generated, the client
10 12 transmits a print request to the server 16 (301). The print request information is job information including the document name, the owner name, the output printer port number and the like of the print job. The print request information does not include print data to be
15 actually used for drawing. The server 16 adds the print request to job information which the server 16 manages, updates the print order (302), and sends an acknowledgment message (print request acknowledgment) to the client 12 (303).

20 Although it will be described in detail later, the print request information from the client 12 and the job information managed by the server 16 include data indicating whether image information is to be transmitted from the client 12 or from the server 16, to
25 the printer 18. In this example, print image data is transmitted from the client 12 to the printer 18.

Next, the client 12 stores the print data generated by the printer driver and the intermediate data (EMF file) obtained from the OS into the image manager 25 serving as a virtual spooler in the client
5 (304).

The server 16 manages the status of the printer 18 as an output destination (305). The server 16 organizes print requests from the respective clients, and controls execution of jobs in a predetermined order while it is
10 determined that the job is in print-output enabled status in the printer.

When the client 12 that transmitted the print request information is in its turn to perform printing, the server 16 transmits transmission permission
15 information (307), indicative of permission of transmission of print data to the printer, to the client 12. Then the client 12 returns permission acknowledgment information (308), which is an acknowledgment response to the transmission permission information, to the
20 server 16, and transmits the print data to the printer (309).

The printer 18 receives the print data and outputs a print image (310). When all the transmitted print data has been print-outputted, an output completion message
25 (311) indicating completion of output is transmitted from a network board of the printer 18 to the client 12

as the print data transmitter. In response to the received message, the client 12 returns an acknowledgment response message (312) to the printer 18.

In this example, the printer 18 transmits the output completion message to the client 12 and the client 12 is informed of the completion of print operation by the printer 18 by the reception of the message, however, it may be arranged such that the client 12 transmits the print image (309) and then the client always monitors the status of the printer 18 by polling the printer so as to be informed of the completion of the print operation. In this case, the message 311 from the printer 18 and the response message 312 to the message 311 can be omitted.

Then, the client 12 sends a print completion message (313) indicative of the completion of printing to the server 16, and the server 16 receives the message and deletes the managed job information (314). Further, the client 12 deletes the print data managed in the image manager 25 (315). At this point, the server 16 registers the print history of the job (316). The print data and the job information may not be deleted at this timing but may be held for a predetermined period, while the printer status is set to an output completion status.

The server 16 transmits a print completion acknowledgment message (317) to the client 12, and the

client 12 receives the message and displays a print completion notification (318) for the user.

The above sequence corresponds to processing in case of client spool. In case of server spool, the
5 storage of the print data and the EMF file (304) is performed by the server 16. In this case, when the client 12 receives the print request acknowledgment from the server 16, the client 12 transmits the print data and the EMF file to the server 16. The server 16 stores
10 the print data and the EMF file received from the client 12, in correspondence with the job information, into the image manager 25. The transmission permission (307) and the transmission permission acknowledgment (308) are not transmitted. The server 16 transmits the print data to
15 the printer 18 (309). The network board of the printer 18 sends the output completion message (311) to the server 16 as the print data transmitter, and the server 16 sends the acknowledgment response message (312) to the printer 18. Then the server 16 sends the print
20 completion message (313) notifying the completion of printing to the client 12. At the same time of the deletion of job information (314), the deletion of print data (315) is performed by the server.

Fig. 4 is a flowchart showing the processing by
25 the server 16 in case of client spool or server spool, corresponding to the sequence in Fig. 3 and the later

description. In this flowchart, "Return" means that processing returns to step S41.

The server 16 starts operation, then process proceeds to step S41, at which the server 16 waits for a
5 command from the respective clients or the printer 18. When a command is received, the process proceeds to step S42, at which the server 16 determines whether or not the received command is print request information.

If the received command is not print request
10 information, the process proceeds to step S43, while if it is determined that the received command is a print completion message (in case of client spool) from the client or the output completion message (in case of server spool) from the printer, the process proceeds to
15 step S45. The output completion message from the printer is a message indicative of the result of print output at step S410 performed prior to this processing. At step S45, the server 16 deletes the output-completed job information. In case of server spool, the print data and
20 the EMF file are deleted at step S46. At step S461, the server 16 registers the history of the print-completed print job as a log. The data indicative of a terminal which sent the print image to the printer 18 is also stored into the log data and registered.

25 At step S47, the server 16 performs job scheduling to determine a print job for the next printing by the

printer. When a job has been determined, the server 16 transmits transmission permission information indicating that transmission of print data to the printer is possible, to the client that registered the job, at step 5 S48 in case of client spool. At step S49, the server 16 monitors time-out by the reception of response to the transmission permission information sent at step S48.

In case of server spool at step S48, or if the response to the transmission permission information has not been received within a predetermined period at step 10 S49, the process proceeds to step S410, at which it is determined that the client that transmitted the print request is down. Then the print data held in the image manager 25 as a spooling area of the server is directly 15 transmitted to the print data. When the transmission has been completed, the completion of print output is waited at step S411.

On the other hand, if the permission acknowledgment information as a response message to the 20 transmission permission information is received without time-out at step S49, the process proceeds to step S412 to receive a printing completion command from the client.

Further, if it is determined that the command received at step S42 is the print request command, the 25 process proceeds to step S414, at which the server 16 determines whether or not print data can be accepted

(spooled). If print data can be accepted, the process proceeds to step S415, at which the job is newly held. As processing of the storage of new job, the server 16 receives the print data and the EMF file from the client
5 and stores them into the image manager 25, and causes the job manager to manage the job information. Then the server 16 returns a print request acknowledgment to the client that transmitted the print request command.

If it is determined at step S414 that the capacity
10 of the image manager 24 is full and the print data and the EMF file cannot be spooled, the process proceeds to step S417, at which an NG message indicating that the print data cannot be spooled is transmitted to the client that sent the print request information. Note
15 that as this does not interfere with the management of print order by job information or the like, the client continues printing by performing client spooling processing. Accordingly, at step S417, the server 16 manages the print order by using the job manager 26 in
20 accordance with the print request information from the client.

As described above, in the present embodiment, the server 16 and the clients respectively have the image manager 25 serving as a spooler. As described about the
25 processing at steps S49 to S411, even if a client which transmitted print request information is down, the

server 16 directly transmits a print image to the printer 18 to perform printing, and normally checks the completion of print operation.

On the contrary, if the server is down or the
5 image manager 25 of the server is in memory-full status, the client can output a print image from its own spooler.

In the above description, print data is spooled in the image manager 25 of the client and the image manager 25 of the server, and the print data is transmitted to
10 the printer alternately from the managers in accordance with circumstance, in a complementary manner. Next, print processing upon designation of spooler by the user will be described.

Fig. 5 is an example of screen image for the user
15 to select the client or the server as a transmitting device to send a print image to the printer. This screen image is a printer registration image in the OS used upon printer port setting.

This figure shows print data to be transmitted to
20 the printer, spooled in the server. In this manner, the user can designate the client or the server to transmit a print image to the printer, in correspondence with operating status or purpose.

In this manner, upon printer port registration in
25 the printer driver, a spool function can be selected for print data output to the printer. Thereafter, the client

and the server can determine a spool function having priority by determination of the selected port of the output destination.

Further, the user selection as shown in Fig. 5 may
5 be set for each job by opening a property image of the printer driver upon print designation.

Fig. 6 is an example of screen image displayed on the display unit of the client when the client obtains a list of jobs managed by the job manager 26 of the server
10 16. In this case, registered jobs are presented on a CRT screen or the like. In this figure, three documents are stacked in a printer queue. The displayed information includes document names, print request times, client names, document generation dates and print data. The
15 print data indicative of server/client as a transmitter to transmit a print image to the printer. For example, "Document 1.doc" indicates that the client transmits the print image to the printer. In this figure, the Document 1 is selected by a pointing device such as a mouse, and
20 various information corresponding to the selected job are emphasized by italicized letters.

Fig. 7 is an example of print logs showing the histories of the jobs in Fig. 6 respectively at the completion of execution. The log may be displayed as
25 shown in Fig. 7 on the CRT, or may be outputted onto a print medium. The display items in this figure are the

same as those in Fig. 6.

As the user interface screen image in Figs. 6 and 7, a job list and print logs are obtained from the server 16 by utility software of the client 12 used in the present print control system, and displayed on the CRT of the client 12. The utility software is stored as a program in the ROM (or an external memory (not shown)) of the respective clients. The above processing is realized by reading the program onto the RAM 24 and executing the program by the CPU 22.

The object of the present invention can be also achieved by providing a storage medium (or recording medium) storing program code of software for realizing the functions of the present embodiment to a system or an apparatus, reading the program code with a computer (e.g., CPU, MPU) of the system or apparatus from the storage medium, then executing the program.

In this case, the program code read from the storage medium itself realizes the functions of the embodiment, and the storage medium storing the program code constitutes the invention. Furthermore, besides aforesaid functions according to the above embodiment is realized by executing the program code which is read by a computer, the present invention includes a case where an OS (operating system) or the like working on the computer performs a part or entire processes in

accordance with designations of the program code and realizes functions according to the above embodiment.

Furthermore, the present invention also includes a case where, after the program code read from the storage medium is written in a function expansion card which is inserted into the computer or in a memory provided in a function expansion unit which is connected to the computer, a CPU or the like contained in the function expansion card or unit performs a part or entire process in accordance with designations of the program code and realizes functions of the above embodiment.

Fig. 8 is a table showing processes stored in a storage medium to realize the functions of the present embodiment. In this case, the storage medium contains processes necessary for both server and client, and only necessary processes are executed in correspondence with the server or client to operate.

In the server 16, in addition to these processes, program code corresponding to the above-described flowchart (in Fig. 4) is stored.

As described above, according to the print server system of the first embodiment, the following advantages can be obtained.

(1) In a system where a server and a client both have a spooler, a user can easily select one of the server and the client to transmit print data to a printer, in

consideration of purpose, operating status and the like,
as a more efficient print-data transmitter.

(2) The information indicating a spooler which transmits
print data to the printer can be externally displayed on
5 a CRT or the like.

(3) As a print log of printing by the printer can be
stored, a more efficient system can be constructed by
analyzing printer operating status or purpose.

As described above, the first embodiment of the
10 present invention uses spool functions of both client
and server, and causes the user to designate a spooler
to transmit print data to the printer. Only when the
designated spooler is down or in another abnormal status,
the print data is transmitted from another device. Thus
15 printing can be ensured.

Next, the print server system according to a
second embodiment of the present invention will be
described with reference to the drawings.

The print server system of the second embodiment
20 has a purpose of selectively using one of the spool
functions of the server and the client.

The construction of the print server system of the
present embodiment is the same as that shown in Figs. 1
and 2, and the basic operation is approximately the same
25 as that shown in Figs. 3 and 4. Only the difference from
Fig. 4 will be described.

When the server 16 receives the print request information from the client at step S42, it checks the port information of the output destination of the print request information or spool designation information. If
5 there is spool designation information, the server 16 checks whether the spool designation information indicates the client or the server. If the spool designation information indicates client spool, the process proceeds to step S415. If the spool designation
10 information indicates server spool, the print data and the EMF file are received from the client, and the process proceeds to step S415.

Further, if there is no spool designation information, the port of output destination is checked,
15 and the port information pre-set in the server is checked. If the port information corresponding to the port of the output destination designated from the client designates client spool, as data to be used in actual drawing such as print data is spooled in the
20 image manager of the client, only the job information included in the print request information is received from the client, and the process proceeds to step S415. If the port information corresponding to the port of the output destination designated from the client designates
25 server spool, as data to be used in actual drawing such as print data is spooled in the image manager of the

server, the print data and the EMF file are received from the client, and the process proceeds to step S415.

Further, in case of server spool, the print data is transmitted from the server to the printer at step
5 S48, so as to perform print output by the printer. The processing such as time-out monitoring in the client is not performed.

Next, an example of selective use of spool functions of the server and the client will be described
10 in the present embodiment.

First, a case where the use of one of the spools is designated by the user's selection will be described. In this case, a screen image as shown in Fig. 9 is displayed on the CRT and the user selects one of the
15 spool functions. In Fig. 9, only the spool function of the server is used. This screen image is a printer registration image in the OS used upon printer port setting. The contents set upon printer registration are transmitted to the server 16 at the same time, and
20 registered as printer port information into the RAM of the server.

Further, as the user interface screen image for selection of spool function as shown in Fig. 9, the property image of the printer driver upon printing
25 designation may be used by the user to perform selection for each job.

As described above, the construction where
spooling is performed in one of the client and the
server has advantages and disadvantages. However, as the
user can select a spool function, in a case where
5 printing assurance is a high priority, the spool
function of the server is used; in a case where LAN busy
status removal is a high priority, the spool function of
the client is used. In this manner, the system can be
constructed in correspondence with operating status or
10 user's purpose.

As described above, according to the second
embodiment of the present invention, the user can
designate one of the spool functions of the client and
the server, and print processing is performed by using
15 only the designated spool function.

Next, the print server system according to a third
embodiment of the present invention will be described
with reference to the drawings.

As in the case of the second embodiment, in the
20 print server system of the third embodiment, one of the
spools of the server and the client is used. However, in
this embodiment, the client automatically determines
which spool function is to be used.

Fig. 10 is a flowchart showing the operation of
25 the system to automatically disable one of the spool
functions in correspondence with the status of the image

manager 25. This flowchart shows the operation of the client to issue a print request to the server.

First, at step S101, the client transmits the print request information (301 in Fig. 3) to the server.

5 The process proceeds to step S102, at which the reception of print request acknowledgment information (303 in Fig. 3) as an acknowledgment message from the server is waited. When the acknowledgment message from the server is received, the process proceeds to step
10 S103, at which print data as an image to be print-outputted is generated by the printer driver. Further, an EMF file as intermediate data generated by the OS at this time is also obtained. When the print data is generated, the process proceeds to step S104, at which
15 the client determines whether or not the image manager 25 as a spooler of the client has a sufficient remaining memory capacity.

If it is determined that the memory capacity is not sufficient to store the print image (memory near-
20 full status), the process proceeds to step S105, at which the CPU 22 of the client turns a flag Nearflag ON. The flag Nearflag indicative of memory near-full status is stored in the RAM 24. The print data is not stored into the spooler of the client. The process proceeds to
25 step S109, at which the client transmits the print data and the EMF file, with spool designation information

indicating that the server spool function is to be used,
to the server. The server spools the print data and the
EMF file received from the client, in correspondence
with the print request information, into the image
5 manager 25.

On the other hand, if it is determined that the
remaining memory capacity is sufficient, the process
proceeds to step S107, at which the CPU 22 of the client
turns the flag Nearflag OFF, and stores the print data
10 as a print image and the EMF file into the image manager
25 as a spooler of the client (304 in Fig. 3) at step
S108. The threshold value used for determination of
memory near-full status may be a predetermined value or
may be a value set by the user.

15 When the print data and the EMF file have been
spooled in the client or the server, the process
proceeds to step S110.

At step S110, the client waits for reception of
transmission permission information (307 in Fig. 3), as
20 a print start message indicating that the client's turn
to perform printing has come, from the server. When the
print start message is received, the flag Nearflag is
referred to at step S111. If the flag is ON, the process
proceeds to step S112, at which a parameter indicating
25 "no spooled data" is set in a response message to the
print start message, and the message is sent to the

server. The server receives the message, and as in the processing at step S410 in Fig. 4, performs print-outputting by using the spooler of the server. Further, it may be arranged such that if it is recognized in the server that the client is already in a memory full status and the print data and the EMF file are spooled in the image manager of the server, the server does not send the transmission permission to the client, but transmits the print data to the printer and only notifies the client of the completion of printing.

If it is determined at step S111 the flag Nearflag is OFF, the process proceeds to step S113, at which the permission acknowledgment information (308 in Fig. 3) as a response message is transmitted to the server. Then at step S114, the print data as a print image is directly sent from the client to the printer (309 in Fig. 3). At step S115, it is determined whether or not all the print data of the print job has been transmitted to the printer. When all the print data has been transmitted, the output completion message (311 in Fig. 3) from the printer is waited at step S116. After the reception of the message, i.e., when the print outputting by the printer has been completed (step S117), the client notifies the server of the completion of printing (313 in Fig. 3) at step S118. Upon reception of acknowledgment of printing completion from the server,

the client deletes the print data and the EMF file stored in the image manager 25.

As described above, in the third embodiment of the present invention, it is automatically determined
5 whether or not the spooler of the client is to be used, in accordance with whether or not the memory is in a near-full status. In addition, it may be arranged such that the spooler of the server is also set to be automatically started. In the third embodiment, the
10 remaining memory capacity of the image manager is used, as an example, for automatic determination for use of the spooler of the client, however, use of spooler may be determined based on other device settings, application used there or the like.

As described above, in the third embodiment of the present invention, the spool functions of the client and the server are set in available status, and the system of the client automatically determines one of the spool
15 functions to be used. Thus a more appropriate spool
20 function is used.

Next, the print server system according to a fourth embodiment of the present invention will be described with reference to the drawings.

The print server system of the fourth embodiment
25 has a purpose that the content of a document, to be printed from any of the spool functions of the server

and the client, can be previewed on the client.

The construction of the print server system of the present embodiment is the same as that shown in Figs. 1 and 2.

5 Next, a case where a print image spooled in the server or the client is previewed in the print server system of the present embodiment will be described.

Fig. 11 is an example of screen image of the manager showing print jobs managed by the server. The
10 display of this user interface image is controlled by the above-described utility software of the client. The software accesses the server and obtains job list information, to display the print jobs managed by the server, in list form. In the present embodiment, a
15 preview display of a print image is designated from the client. The information displayed in the screen image is information managed by the server. Three documents are stacked in a printer queue. In Fig. 11, as it is
20 understood from the numbers displayed as client names, different clients have requested to print these documents.

In this screen image, a Document 1 is selected by a mouse cursor. From this status, a preview function can be started. The preview function is to display a brief
25 image of a document to be printed on the display screen.

Fig. 12 is a flowchart showing the operation upon

start of preview function. The above-mentioned utility software of the client performs communication with the server via the network, and based on a job list obtained from the server, displays the user interface screen

5 image as shown in Fig. 11 on the display unit of the client. In the user interface screen image, the user selects a job and clicks an OK button 1101 by using a pointing device such as a mouse, and then the present processing is executed.

10 First, at step S121, the client determines whether or not the print data and the EMF file of the job selected in the user interface screen image exist in the image manager of the client. If the client determines that the print data and the EMF file do not exist in the
15 image manager of the client, the process proceeds to step S122. At step S122, the client downloads the EMF file from the server and stores it into the image manager. At step S123, the client reads the EMF file from the image manager of the client, and forwards the
20 EMF file to the Win32API as the drawing means provided by the OS. Then the client causes the Win32API to display-output the EMF file, and displays a preview image on the display unit.

In this manner, in a case where the server and the
25 client both have a spooler, if an image exists in the client upon start of preview function, time necessary to

download the print image from the server can be omitted.

As in the case of the first embodiment, in the above second to fourth embodiments, it may be arranged such that a storage medium (or recording medium) storing program code of software for realizing the functions of the embodiments is provided to a system or an apparatus, and a computer (e.g., CPU, MPU) of the system or apparatus reads the program code from the storage medium, then executes the program.

Fig. 13 is a table showing processes stored in a storage medium to realize the second to fourth embodiments of the present invention. In this case, the storage medium contains processes necessary for both server and client, and only necessary processes are executed in correspondence with the server or client to operate.

As described above, according to the print server system of the second to fourth embodiments, the following advantages can be obtained.

- (1) As the server and the client both have a spooler, printing can be ensured even if one of the spoolers has a trouble.
- (2) As the user can set whether or not the server and the client respectively perform spooling, the system can provide high operability corresponding to the user's requirements.

